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IS 5441 (1986): Portable pneumatic drilling machine [PGD 8: Pneumatic Tools]

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Indian Standard

SPECIFICATION FOR PORTABLE PNEUMATIC DRILLING MACHINE

(First Revision)

1. Scope — Covers the requirements for reversible and non-reversible portable pneumatic drilling machines suitable for drilling holes up to 76 mm diameter.

2. Terminology

2.1 *Portable Drilling Machine* — A drilling machine with rotary air motor working on compressed air as its motive power and designed to be held in operator's hand during working.

2.2 *Gauge Pressure* — Steady pressure of compressed air measured within 3 metres from inlet of drilling machine.

2.3 *Air Consumption* — Volume of air corrected to standard atmospheric conditions of temperature and pressure according to IS : 196-1966 'Atmospheric conditions for testing (*revised*)', consumed by the drilling machine during the test.

3. Types

3.1 *Based on Drilling Axis*

3.1.1 *Straight type* — When the drilling axis is parallel to that of the air motor, the drilling machine shall be termed as straight type (*see* Fig. 1). These shall be designated by letter *S*.

3.1.2 *Angle type* — When the drilling axis is at an angle to that of the air motor, the drilling machine shall be termed as angle type. The angle may be 30°, 45° or 90° (*see* Fig. 2). Angle type shall be designated by letter *V* followed by the angle, for example 'V 30°'.

3.2 *Based on Direction of Rotation*

3.2.1 *Reversible type* — When the drilling machine can run in both the directions of rotation it shall be termed as reversible type and shall be designated by letter *R*.

3.2.2 *Non-reversible type* — When the drilling machine can run only in clockwise direction of rotation when looking from the non-driving end, it shall be termed as non-reversible type and shall be designated by letters *NR*.

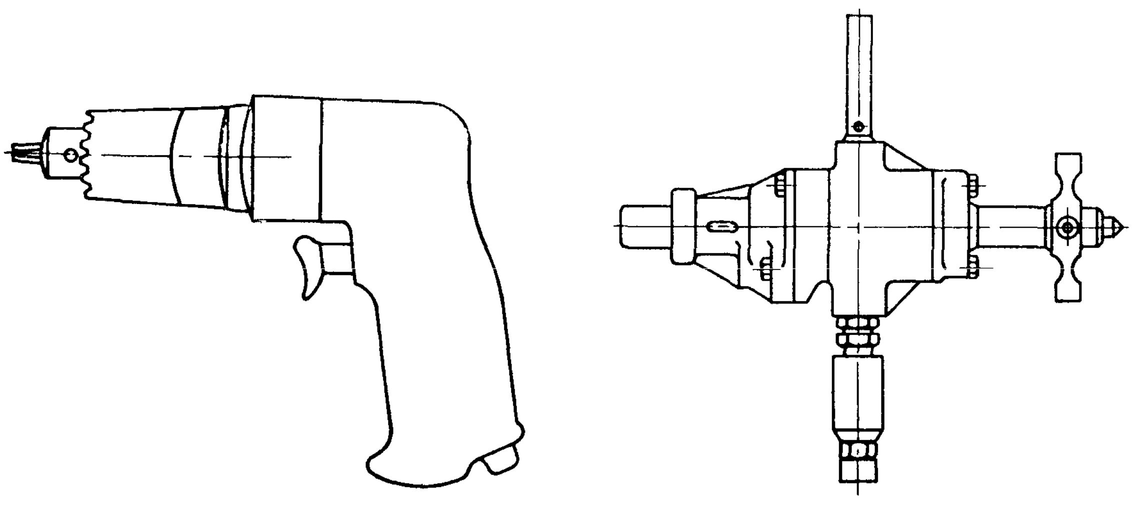

FIG. 1 STRAIGHT TYPE

Pneumatic Tools Sectional Committee, EDC 64; Pneumatic Hand Tools Subcommittee, EDC 64 : 2 [Ref : Doc : EDC 64 (4223)]

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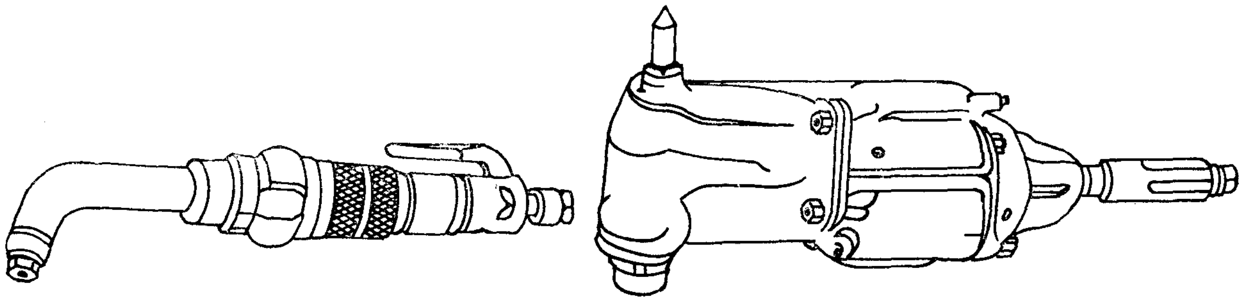


FIG. 2 ANGLE TYPE

4. Nominal Size, Mass and Drilling Capacity — Shall be as given below:

Nominal Size	*Drilling Capacity in Mild Steel Up to and Including*	*Nominal Size of Chuck*	*Morse Taper Socket*	*Mass kg*	*Air connection Size According to IS : 554-1975*
4	4·8	4(6)	—	1·3	RC¼
6	6·5	6	—	1·8	RC¼
8	8·0	8	—	1·9	RC¼
10	10·0	10	—	2·8	RC¼
13	13·0	13	—	3·1	RC¼
14	14·5	(16)	1,2	8·0	RC½
16	16·0	(16)	2	10·0	RC½
23	23·0	—	2	14·5	RC½
25	25·5	—	3	16·0	RC½
31	31·5	—	3	17·5	RC½
38	38·5	—	4	20·0	RC½
50	50·5	—	4	22·5	RC½
64	64·0		5	26·0	RC½
76	76·0		5	31·5	RC½

Note 1 — The value given in paranthesis are non-preferred.

Note 2 — The drill chucks shall be in accordance with IS : 2243-1971 'Specification for drill chucks'.

Note 3 — Morse taper socket shall be in accordance with IS : 1715-1986 'Dimensions for self-holding tapers (*second revision*)'.

Note 4 — Nominal size 4 drilling machine may be fitted with 4·8 mm size collect chuck.

Note 5 — Mass specified is recommendatory and is for the guidance of manufacturers and users.

5. Designation — A portable pneumatic drilling machine straight and reversible type of nominal size 13 shall be designated as:

Pneumatic Drilling Machine S-R 13 IS : 5441

A portable pneumatic drilling machine with 30° angle head, non-reversible type of nominal size 10 shall be designated as:

Pneumatic Drilling Machine V 30°—NR 10 IS : 5441

6. General Requirements

6.1 *Speed Control* — Drilling machines of nominal size 13 and above may be provided with a governor or any other device to prevent excessive speeds, air consumption and to maintain efficient speed under loads within the capacity of the drilling machine.

6.2 *Lubrication* — Arrangements shall be made to lubricate bearings, gears and other moving parts not lubricated from inline oil lubricator.

6.3 *Air Inlet Connection*

6.3.1 Air inlet connection shall be fitted with an air strainer or screen which shall be effective in retaining solid particles in compressed air supply. The strainer or screen shall be of such design that it may be readily cleaned.

6.3.2 Air inlet connection shall have female pipe threads of the nominal sizes as given at **4**, conforming to IS : 554-1975 'Dimensions for pipe threeds where pressure tight joints are required on the threads (*third revision*)'.

6.4 *Handles* — The drills shall have any one of the recommended styles of the handles shown in Fig. 3.

6.5 *Throttle* — The drilling machine shall have any one of the types of manual throttling mechanism incorporated in the body of the drill for admitting shutting off and regulating the supply of air (*see* Fig. 4).

6.6 *Workmanship and Finish* — The drilling machine shall be free from harmful flaws, cracks, burrs and other imperfections and shall be finished satisfactorily.

6.7 *Instruction Manual* — Each tool shall be supplied with a instruction manual. Data to be provided in the instruction manual shall be in accordance with IS : 11609-1986 'Technical supply conditions for pneumatic tools'.

7. Tests

7.1 *Measurements of Air Consumption* — Air consumption shall be determined with either liquid displacement meter or any suitable flow measuring instrument. The flow measuring instrument shall be located within 3 metres from the drilling machine. The air consumption reading shall be corrected to standard atmospheric conditions of temperature and pressure conforming to IS : 196-1966.

7.2 *Measurement of Speed* — For measurement of speed, a revolution counter, free from slip, shall be used.

7.3 *Measurement of Pressure* — For measurement of air pressure, gauges of any suitable type shall be used. The pressures to be read shall fall between one fourth and three-fourths of full scale reading. The pressure gauge shall be located within 3 meters from the drilling machine. The pressure shall remain constant at 6·0±0·5 bars during testing.

7.4 *No Load Tests* — No load running shall be carried out for minimum 3 minutes for the non-reversible type and for minimum 3 minutes in each forward and reverse direction for reversible type. Spead and air consumption shall be measured during no load test. The speed shall be within −5 percent and air consumption shall be within +5 percent of the declared values.

7.5 *Load Test* — The load test of the drilling machine shall be carried out on a suitable dynamometer of suitable capacity and accurate calibration. The load shall be applied on the drilling chuck or the socket of the drilling machine only after it is subjected to a preliminary running of at least 30 seconds. Speed, torque and air consumption shall be measured during load test. The power output is calculated from speed and corresponding torque measured on the dynamometer by using the formula:

$$P = \frac{2\pi n}{60} M \times 10^{-3}$$

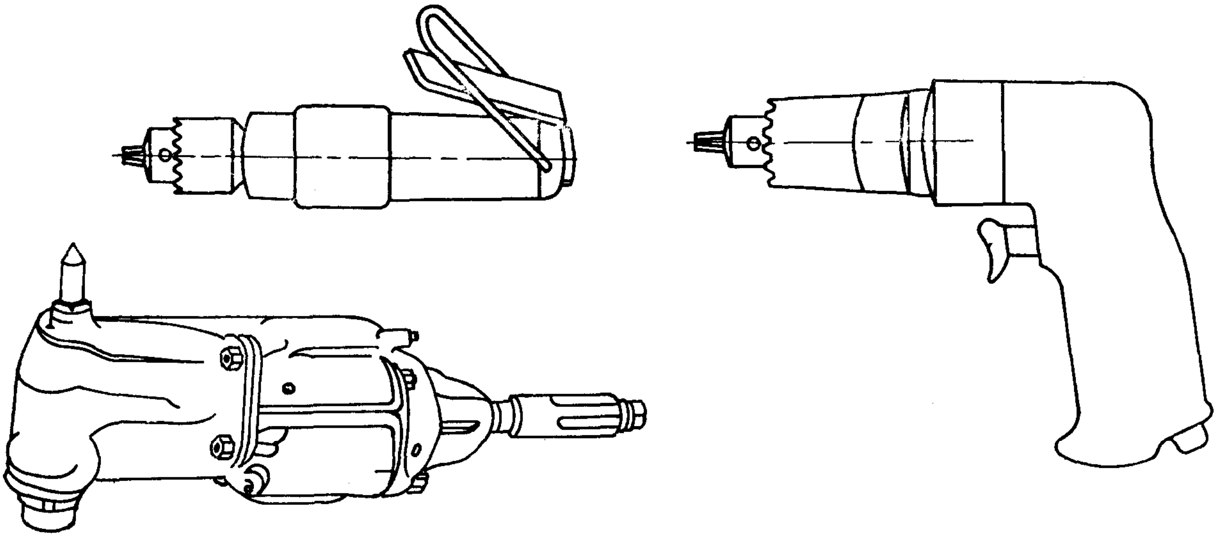
where

P = power in kilowatts,

M = torque in newton-metres, and

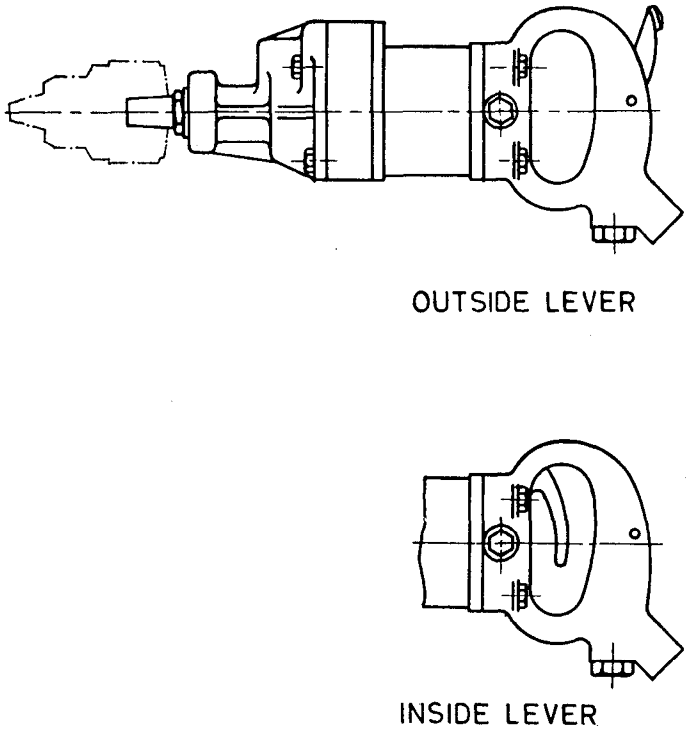
n = speed in revolutions per minute.

Speed and power shall be within −5 percent of the declared values and the air consumption shall be within +5 percent of the declared values.

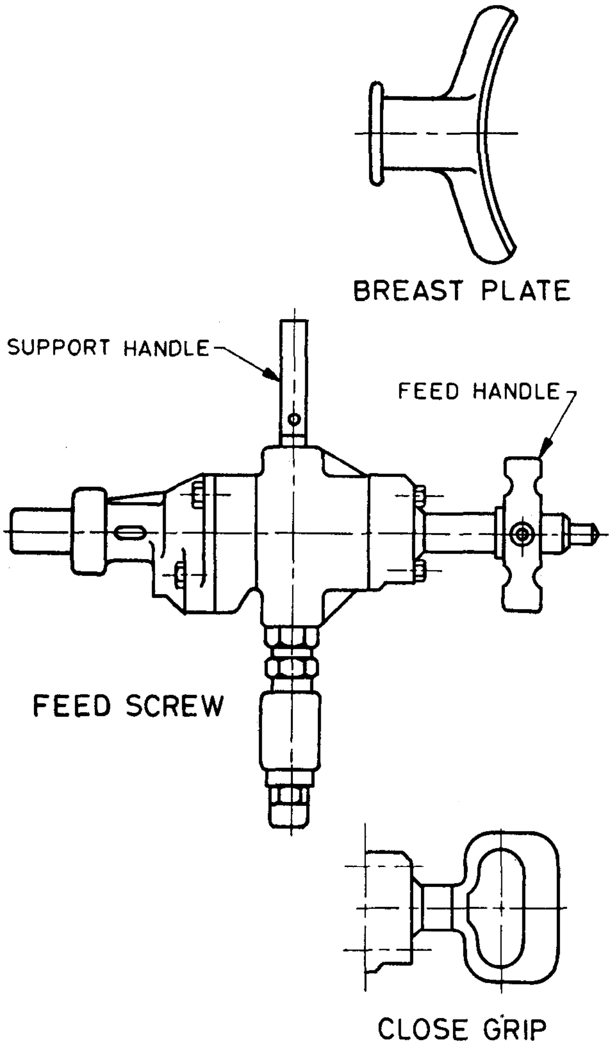


a) Body Grip with Straight Handle

b) Pistol Grip

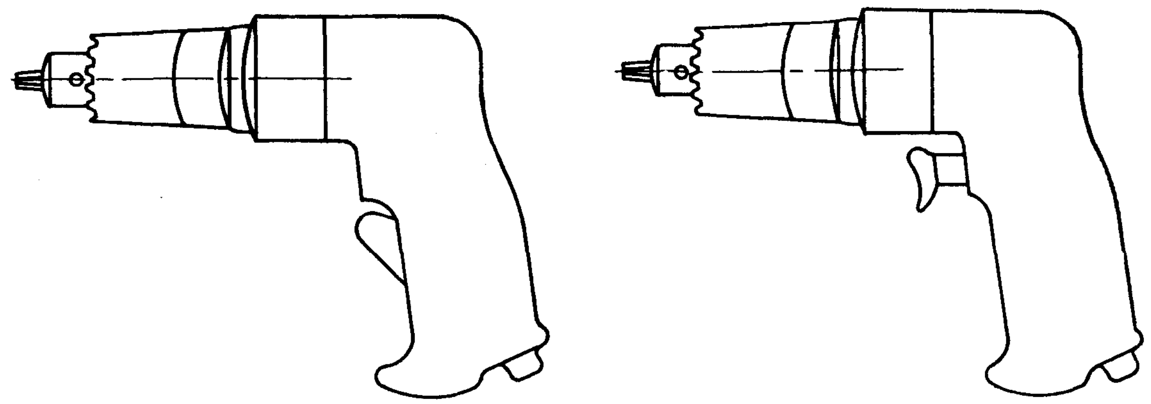


c) Single Hand Grip Close
(Inside or Outside Lever)

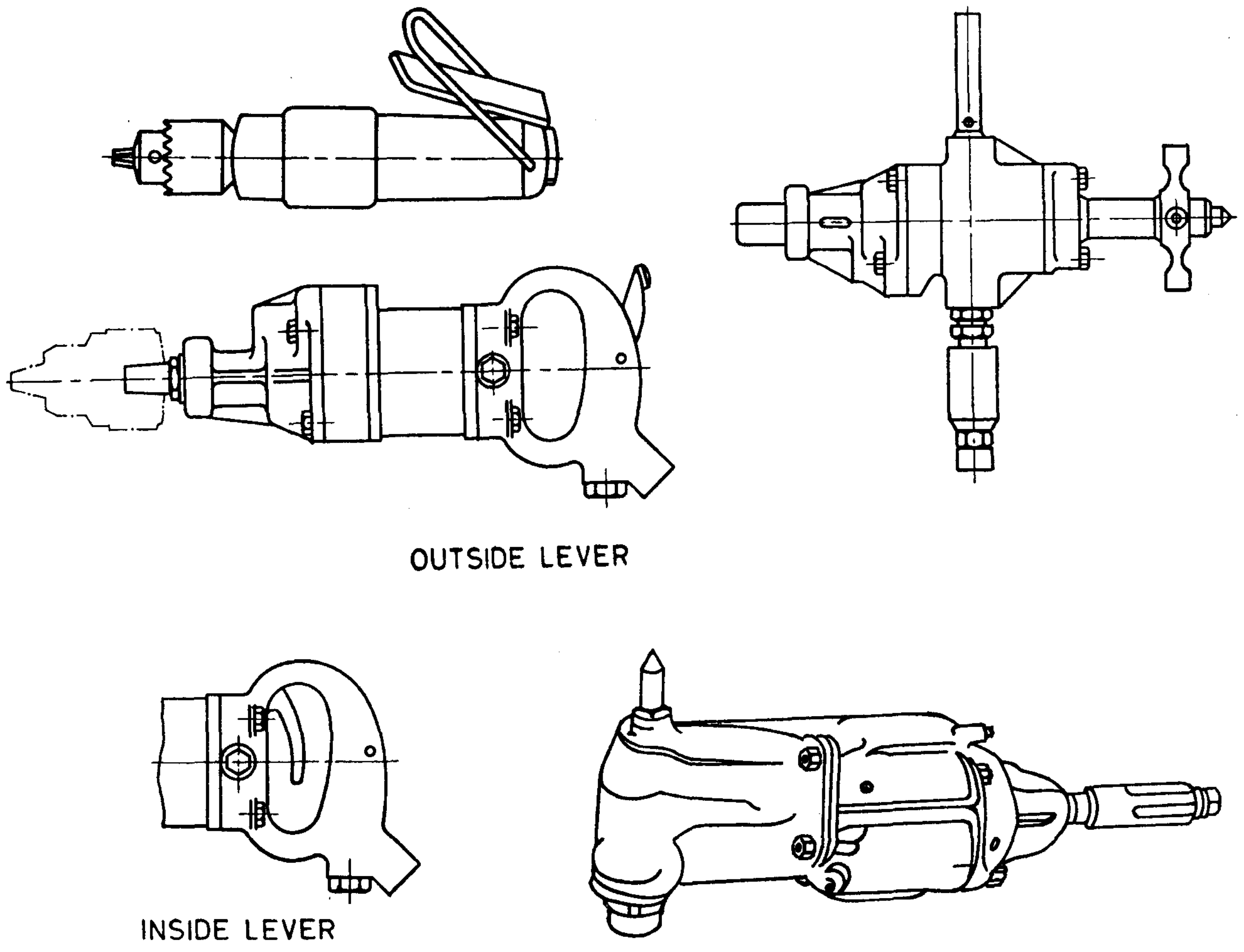


d) Double Hand Grip:
i) Breast Plate,
ii) Feed Screw, and
iii) Close Grip

FIG. 3 TYPES OF HANDLES



a) Trigger b) Push-Button



c) Lever (Inside or Outside) d) Twist Throttle

FIG. 4 TYPES OF THROTTLES

7.6 *Eccentricity Test* — For drilling machines fitted with chucks, the method of testing eccentricity shall be as given in IS : 2243-1971. The drilling machines fitted with Morse Taper sockets shall be tested with the test mandrel conforming to IS : 2063-1962 'Code for testing' machine tools. The maximum runout shall not exceed the limits given below:

Nominal Size	*Permissible Eccentricity* mm	*Nominal Size*	*Permissible Eccentricity* mm
4	0·17	23	0·22
6	0·17	25	0·27
8	0·22	31	0·27
10	0·22	38	0·4
13	0·22	50	0·4
14	0·22	64	0·4
16	0·22	76	0·4

7.7 *Operation Test* — Each drilling machine shall be tested for easy starting and stopping for non-reversible types and in each forward and reverse direction for the reversible types. It shall also be tested for easy fitment and removal of the drill point in collect, chuck or socket. During testing there shall be no abnormal noise and excessive temperature rise. The drilling machine shall show no flaws which may have been developed during testing.

7.8 *Endurance Test*

7.8.1 *For type approval* — Each sample conforming to the specification shall be run in the test rig to disseminate energy for 100 hours in the manufacturer's test room (100 h run need not be a stretch and may be done over a period) after which the tool shall be dismentled and all parts shall be examined. No part shall either break during test or be found broken, cracked or deformed.

7.8.2 *For Routine Testing* — One percent, the minimum being one, of tools on order, if the order is of 50 pieces or more, shall be run on the test rig for 15 hours run (need not be at a stretch) after which the tool shall be dismantled and all parts shall be examined. No part shall either break during testing or be found broken, cracked, deformed or how signs of excessive wear on examination.

8. Marking — The drilling machine shall be marked at a suitable place so that in the course of normal use the markings do not get damaged. The drilling machine shall be marked with manufacturer's name or trade-mark, type, nominal size, rated pressure and revolutions per minute. They shall also preferably be marked with serial number and the year of manufacture.

8.1 *ISI Certification Marking* — Details available with the Indian Standards Institution.

9. Packing — Before packing, the inlet, exhaust and other openings of each tool shall be adequately protected/covered against entry of dust and other harmful material. Packing shall be done in accordance with IS : 11609-1986 'Technical supply condition for pneumatic tools'.

EXPLANATORY NOTE

This specification was first issued in 1969. This revision is based on the experience gained in this industry. Assistance has also been taken from the data supplied by the leading manufacturers of the product. The tolerances on air consumption, power, speed and load test have been specified on the values declared by the manufacturers. Packing clause has also been modified.

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